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Stellar Planet Survey (STEPS)

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The Stellar Planet Survey (STEPS) is an ongoing search for Jupiter-mass and larger planets around 30 nearby dwarf M stars. Since these are by far the most ubiquitous stars, we can make a strong statement about the prevalence of planets in the galaxy, if we measure the frequency of occurrence of planetary systems around such stars. This is a region of discovery space mostly unexplored in the successful radial velocity planetary searches, since they are more sensitive to bright stars, typically solar-type, and "hot" giant planets. STEPS is more sensitive to "cold" giant planets. Such planetary systems are more likely to contain habitable planets.

We use our own large-format, high-precision camera on the Palomar 200" telescope to perform astrometric observations. Calibration has been performed both in the laboratory and with star clusters yielding consistent results. Approximately 10 nights/year of observations spaced around the calendar allow us to monitor each of the stars in our sample at least twice per year, with a lower limit to period detections, because of sampling, at about 1.5 years. Our observing baseline for some of our target stars now extends to 2.9 years, enabling searches for planets with periods of this order. We now have the sensitivity to explore an orbital period region where giant planets in solar-like systems around late-type stars may exist. Our nightly precision is typically 0.4 milliarcseconds for each target. Thus far, our standard deviations from the proper motion- and parallax-removed data are on order 2 milliarcseconds including both noise and possible signal. Already, >10-Jupiter mass planets in 1.5-2.9-year orbits are excluded in some of our sample. We show the results of calibrations and stellar measurements in this presentation.

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